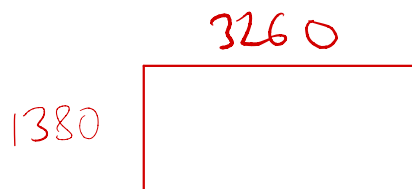


## Scientific Notation (2)

Do now:



### Question 1

A rectangle is 3260 cm long and 1380 cm wide.

- (a) Find the perimeter of the rectangle, giving your answer in the form  $a \times 10^k$ , where  $1 \leq a < 10$  and  $k \in \mathbb{Z}$ . [3]

- (b) Find the area of the rectangle, giving your answer correct to the nearest thousand square centimetres. [3]

$$a) (3260 + 1380) \times 2 = 9280 = \underline{9.28 \times 10^3 \text{ cm}}$$

$$b) 3260 \times 1380 = 4498800 = \underline{4499000 \text{ cm}^2}$$

↑  
thousand

### Question 2

Given that  $y = \frac{6x^3}{2p - q}$ .

- (a) Find the **exact** value of  $y$  when  $x = 10.5$ ,  $p = 0.381$  and  $q = 0.657$ . [2]

- (b) Write down your answer to part (a)

(i) correct to the nearest 1000;

(ii) correct to three significant figures. [2]

- (c) Write your answer to **part (b) (ii)** in the form  $a \times 10^k$ , where  $1 \leq a < 10$  and  $k \in \mathbb{Z}$ . [2]

$$a) y = \frac{6(10.5)^3}{2(0.381) - 0.657} = 6.615 \times 10^4$$

b) i)  $66150 \rightarrow 66000$  (nearest 1000)

ii)  $66150 \rightarrow 66200$  (3 s.f.)

$$c) \underline{66200} = 6.62 \times 10^4$$

# Task 1

Index Form	Calculation	Number Form
$10^6$	$10 \times 10 \times 10 \times 10 \times 10 \times 10$	1,000,000
$10^5$	$10 \times 10 \times 10 \times 10 \times 10$	100,000
$10^4$	$10 \times 10 \times 10 \times 10$	10,000
$10^3$	$10 \times 10 \times 10$	1000
$10^2$	$10 \times 10$	100
$10^1$	$10$	10
$10^0$	$1$	1
$10^{-1}$	$\frac{1}{10}$	0.1
$10^{-2}$	$\frac{1}{10 \times 10}$	0.01
$10^{-3}$	$\frac{1}{10 \times 10 \times 10}$	0.001
$10^{-4}$	$\frac{1}{10 \times 10 \times 10 \times 10}$	0.0001
$10^{-5}$	$\frac{1}{10 \times 10 \times 10 \times 10 \times 10}$	0.00001

# Task 2

Scientific notation	Calculation	Normal Number
$3 \times 10^4$	$3 \times 10 \times 10 \times 10 \times 10$	30,000
$3 \times 10^{-4}$	$3 \div 10 \div 10 \div 10 \div 10$	0.0003
$2 \times 10^{-4}$	$2 \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}$	0.0002
$7 \times 10^{-3}$	$7 \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}$	0.007
$6.2 \times 10^{-5}$	$6.2 \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}$	0.000062
$2 \times 10^{-1}$	$2 \div 10$	0.2
$8 \times 10^{-3}$	$8 \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}$	0.008

Using your Graphic Display Calculator (GDC)

Use the EE button. Do not give answers in the form  $6.E9 \rightarrow$  convert  $6 \times 10^9$

## Standard Form Revision

<b>(a)</b>	<b>(b)</b>	<b>(c)</b>	<b>(d)</b>
Write 60 000 000 in standard form.  $6 \times 10^7$	Write 163 000 in standard form.  $1.63 \times 10^5$	Write 0.07 in standard form.  $7 \times 10^{-2}$	Write 0.002945 in standard form.  $2.945 \times 10^{-3}$
<b>(e)</b>	<b>(f)</b>	<b>(g)</b>	<b>(h)</b>
Write $6 \times 10^5$ as an ordinary number.  600 000	Write $7.23 \times 10^6$ as an ordinary number.  7 230 000	Write $9 \times 10^{-3}$ as an ordinary number.  0.009	Write $3.92 \times 10^{-5}$ as an ordinary number.  0.0000392
<b>(i)</b>	<b>(j)</b>	<b>(k)</b>	<b>(l)</b>
Put these numbers in order, smallest to biggest: $8 \times 10^{-2}$ , $0.076$ , $87 \times 10^{-3}$  $0.076$ , $8 \times 10^{-2}$ , $87 \times 10^{-3}$	Work out the value of $(7.22 \times 10^6) \div (5 \times 10^{-3})$ Give your answer in standard form.  $1.444 \times 10^9$	Work out the value of $(3.2 \times 10^3) \times (8 \times 10^5)$ Give your answer in standard form.  $2.56 \times 10^9$	Work out the value of $(9.2 \times 10^{-3}) - (5.6 \times 10^{-5})$ Give your answer in standard form.  $9.144 \times 10^{-3}$
<b>(m)</b>		<b>(n)</b>	
The diameter of the Sun is $1.4 \times 10^6$ km. The diameter of Mars is $6.8 \times 10^3$ km. Find the ratio of the diameter of Mars to the diameter of the Sun. Give your answer in the form $1 : n$ , where $n$ is rounded to the nearest integer.  $1 : 206$		The land area of India is $3.29 \times 10^6$ km. The land area of Turkey is $7.84 \times 10^5$ km. The land area of South Africa is $1.22 \times 10^6$ km. Find the mean land area of the three countries, giving your answer in standard form to 3 significant figures.  $1.76 \times 10^6$	

## Practical Standard Form

**(a)**

The table shows the diameter of some planets in the solar system.

Planet	Diameter (km)
Earth	$1.3 \times 10^4$
Mercury	$4.8 \times 10^3$
Neptune	$4.9 \times 10^4$
Saturn	$1.2 \times 10^5$

(i) Calculate the difference, in km, between the diameter of Earth and the diameter of Saturn. Give your answer in standard form.

$$1.07 \times 10^5 \text{ km}$$

(ii) The diameter of Neptune is  $k$  times bigger than the diameter of Mercury. Find the value of  $k$  to 1 decimal place.

$$10.2$$

(iii) Find the ratio of the diameter of Saturn to the diameter of Mercury in the form  $n : 1$

$$25 : 1$$

**(b)**

The table shows the populations of some European countries.

Country	Population
Belgium	$1.16 \times 10^7$
Estonia	$1.33 \times 10^6$
Iceland	$3.41 \times 10^5$
Russia	$1.46 \times 10^8$

(i) Calculate the total population of these four countries. Give your answer in standard form to 3 significant figures.

$$1.59 \times 10^8$$

(ii) How many more people live in Estonia than live in Iceland? Give your answer in standard form.

$$9.89 \times 10^5$$

(iii) Calculate the ratio of the population of Belgium to the population of Russia. Give your answer in the form  $1 : n$ , where  $n$  is rounded to 1 decimal place.

$$1 : 12.6$$

**(c)**

The table shows the areas in square kilometres of four Asian countries.

Country	Area (km <sup>2</sup> )
China	$9.6 \times 10^6$
Hong Kong	$1.11 \times 10^3$
Japan	$3.78 \times 10^5$
Pakistan	$7.96 \times 10^5$

(i) Calculate the total area of China, Japan and Hong Kong. Give your answer in standard form to 3 significant figures.

$$9.98 \times 10^6 \text{ km}^2$$

(ii) Calculate the difference in area between China and Pakistan. Give your answer in standard form.

$$8.804 \times 10^6 \text{ km}^2$$

(iii) The population of Hong Kong is 7.48 million. Find the population density of Hong Kong to the nearest integer, where:  
*Population density = Population ÷ Area*

$$6739 \text{ people/km}^2$$